

Claims

1. A method to prepare human collagen or human procollagen which method comprises:

recovering milk from the mammary glands of a
5 nonhuman mammal which mammal has been modified to contain
an expression system which comprises a coding nucleotide
sequence encoding at least one human procollagen operably
linked to control nucleotide sequences that effect
expression specifically in milk protein-secreting
10 epithelial cells of said mammary glands under conditions
wherein said coding nucleotide sequence is expressed to
secrete human procollagen or human collagen into the milk
of said mammal; and

recovering the human procollagen or human
15 collagen from the milk.

2. An expression system for production of human procollagen or human collagen in milk which expression system comprises a coding nucleotide sequence encoding human procollagen operably linked to a promoter capable of specifically effecting expression in milk protein-secreting cells of mammary glands.

3. The expression system of claim 2 wherein the human procollagen is the pro- $\alpha 1$ chain of type I collagen or is the pro- $\alpha 1$ chain of type III collagen.

25 4. A fertilized nonhuman egg containing the
expression system of claim 2.

5. A nonhuman embryonic stem cell modified to contain the expression system of claim 2.

6. A transgenic nonhuman mammal which comprises the expression system of claim 2.

5 7. The nonhuman mammal of claim 6 which has been further modified to contain at least one expression system which effects the production of posttranslational modification enzymes for procollagen.

10 8. Milk containing human collagen or human procollagen.

9. A human procollagen or human collagen composition containing only procollagen or collagen molecules of a single collagen type.

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